REMARKS

The Office Action dated August 29, 2005 has been read and carefully considered and the present Amendment submitted in order to present further evidence of the patentability of the claims in the application.

In that final Office Action, claims 1-20, 28, 30-33, 35-37, and 39-53 were rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement based on the new claim language to the effect that the "substrate has not been optically polished". The Examiner has pointed to the specification, pages 5-6 as stating that the present substrate was optically polished using an optical cloth and polishing compound followed by a water polishing. The same claims were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention generally based upon the same contention.

As to the prior art rejection, claims 1-20, 28, 30-33, 35-37, 39-44 and 46-53 were rejected under 35 U.S.C. 103 (a) as being unpatentable over Gagnon *et al*, U.S. Patent 5,764,355 in view of Persyk *et al*, U.S. Patent 6,328,027 further in view of Applicants purported admitted prior art or Izumi, U.S. Patent 4,932,780.

On July 28, 2005, the inventor, Robert Herpst and the undersigned attorney conducted an interview with Examiner Lyle Alexander in order to discuss the grounds of the final rejection and to clarify the issues remaining with the application. Applicant appreciates the helpful and courteous interview with Examiner Alexander. A copy of the Interview Summary is attached hereto and, in summary, as to the Section 112 rejections, it was pointed out by Applicant that the reference to optical polishing on pages 5 and 6 of the specification were actually referring to the prior art and not to the present invention. The sample card of the present invention is not optically polished and it is submitted that the specification does not refer to any optical polishing of the present invention; in fact, the lack of optical polishing is a

decided advantage in producing the sample holder of the present invention at a reasonable cost.

Specifically, the polishing of the crystals pointed out by the Examiner relates to the polishing of "blanks" and the reference to those blanks is in the "Background of the Invention" section of the application where the prior art is discussed. The problem with those "polished" blanks is further discussed on page 6, line 5 *et seq* where the blanks are described as costing 2.5 to 4 times "what a polymer sample card will cost" and the disclosure is to illustrate the advantages of the sample cards of the present invention that are competitively priced with respect to the polymer sample cards and blanks. The present sample cards are thereafter contrasted to the prior art "polished" blanks, for example, at page 16, lines 4 *et seq* where it is stated that through the present invention and its steps, "most of the labor intensive steps required to produce a crystal blank or other optical blank can be eliminated". Note also, page 16, line 24, as follows:

"Use of cleaved crystal windows is quite inexpensive compared to manufacturing crystal blanks as many labor intensive steps are avoided and issues of handling and humidity control associated with precision optical polishing of the hygroscopic materials are eliminated."

Also note, page 8, line 26, there is clearly stated, in the "Summary of the Invention" section, "A particularly advantageous feature is that the surface of the window material, albeit somewhat rough, does <u>not</u> need to be laboriously polished or prepared in order to transmit an adequate amount of energy to be useful for spectroscopic analysis." (Emphasis added).

There is a clear distinction made between the precision polishing which is described in detail on page 6, beginning at line 17, and the cutting means used in producing the sample substrate material of the present invention. The laborious task of precision polishing the opacity of an optical crystal blank must be overcome by fine polishing with successively finer grades of grinding compound or water polishing and it is certainly clear that the materials used as the sample holding substrates with the sample card of the present invention are not precision polished.

As to the rejection based upon Section 112, second paragraph, the definition of the

phrase "not been precision optically polished" would also seem to be clearly described and thus defined in the specification. As stated, in the paragraph beginning at line 17 of page 6, the steps of precision optical polishing are fully described and those laborious steps are clearly distinguished between the steps of preparing a substrate of the present invention i.e. cutting, which includes cleaving, fly cutting, chipping or scaling. Note the text on page 8, beginning at line 17, in the "Summary of the Invention" where it is stated:

> 'A crystal or other light transmitting material sample supporting window material is prepared by cutting the window material, it being understood that by "cutting" it is intended to cover various individual techniques for preparing the surface of the window material without using an abrasive grinding or polishing medium, including, but not limited to: cutting, chipping, milling cleaving, fly cutting, sawing and scaling of the material.'

None of those steps carried out with the present invention is or can be confused with the optical polishing as set forth and described in the specification. Thus it would seem to be clear what is and what is not "precision optical polishing". As such, it is submitted that the basis for the claims is fully described in the specification and that the rejections based upon Section 112, first and second paragraphs, should be withdrawn.

The prior art was also discussed during the interview and Applicant pointed out that the Gagnon *et al* reference discloses a <u>porous receiving means</u> (Gagnon *et al*, column 5, lines 10 *et seq*) such as a screen with a grid pattern or a microporous sheet. In particular, the microporous sheet is described in Gagnon *et al* as having pores characterized by 0.1 to 50 um pores (Gagnon *et al*, column 3, lines 19-20). As described, the void volume of the Gagnon *et al* receiving means is greater than 20%, and typically 50% to 90% (Gagnon *et al*, column 6, lines 48-61). Such a microporous sheet would be a polymer such as polyethylene, polypropylene or polytetrafluroethylene (PTFE). (Gagnon *et al*, column 8, lines 27-41).

The use of a screen or mesh is discussed in Applicant's specification along with the disadvantages of that type of sample receiver on page 4, beginning at line 9. As there described, the use of microporous sheets or screens are functionaly different than crystal optical materials when used in spectroscopy since the microporous sheets absorb the energy from the spectrophotometer and create absorption peaks as shown in Applicant's Figure 1 with respect to polytetrafluroethylene and Figure 2 with respect to polyethylene. As discussed in Applicant's specification, PTFE has absorbance peaks in the 130 to 450 cm^{-1} range (page 12, line 17 *et seq*). Polyethylene has strong absorbancies at 2918.7 $cm.^{-1}$ and 2849.9 cm^{-1} (page 2, line 22 to page 3, line 2). These absorbance peaks are not desirable as they interfere with the analysis of the samples (page 13, lines 12-26). It is also noted in the specificaton that the crystal optics used in the prior art do not have such absorbance peaks when properly prepared. (page 13, lines 12-26). As also explained in Applicant's specification, particularly with reference to Figures 8, 9 and 10 illustrating the present invention, the cleaved crystal windows perform comparable to the prior art polished crystals (page 15, line 25 *et seq*) and they do not exhibit absorbance peaks of the type shown for the microporous sheets of the prior art sample cards using polyethylene and PTFE (referring again to Applicant's Figures 1 and 2).

As was noted in Truett, U. S. Patent 5,453,252, cited in Gagnon et al:

"FIG 2 depicts a card 5 containing a porous polyethylene or porous polytetrafluroethylene window 6 upon which a sample of liquid or solution of a solid or a paste can be placed. The card FIG. 2 is then placed in the cell slide of a FTIR spectrometer and a spectrum determined. The problem with this device is that the spectrum of the porous paper is also determined in addition to that of the sample applied to the card window. This complicates the interpretation of the IR specrum and renders information in four critical areas of the spectrum uncertain in the case of the polyethylene window and several valuable areas are also useless when the polytetrafluroethylene paper is used." (Column 1, lines 43-54).

The Gagnon *et al* reference specifically refers to Truett as disclosing a screen suitable for the Gagnon *et al* sample holder and Applicant's Figure 7 illustrates the Janos

device that is produced by use of the disclosure of the Truett patent. That the receiving means of Gagnon *et al* must be porous is well described and, indeed, the teaching of Gagnon *et al* is to encircle that porous area where the sample is to be placed with a nonporous perimeter, thereby making it clear that the Gagnon *et al* sample holder must have a porous receiving means. As further disclosed in Gagnon *et al*, the preferred material for the sample receiving means is a microporous polymer sheet.

Applicant's substrate is not a porous screen for receiving and holding the sample to be analyzed nor, of course, is it a polymer. Applicant's substrate is comprised of a crystal produced by very specific steps defined in the claims and the material allows infrared light to pass therethrough without the infrared light transmitting sample supporting substrate or any other material within the aperture substantially absorbing infrared light within a substantial portion of the infrared spectral range. Thus, Applicant's sample holder is dissimilar to the Gagnon *et al* holder where the grid or screen is intended to form a base for holding the sample such that the infrared light can pass through the sample located in the voids of the screen and not through the substrate itself. To the contrary, the substrate of the present invention does not have voids that allow the infrared light to pass through the substrate unimpeded so as to pass only through a sample residing in those voids. The substrate of the present invention is comprised of a crystal that is non-porous thereby requiring the infrared light to pass through the substrate which therefore cannot substantially absorb infrared light since otherwise the eventual analysis would be affected by the absorption of the infrared light by the substrate.

There is recited in the claim language an infrared light tramsmiting sample suporting substrate and that term is further defined in the specification to be a crystal. By definition, a crystal is a solid. The Phonics Dictionary starts its definiton of a crystal as "A solid with a structure that exhibits a basically symmetrical and geometric arrangement". Further, in dictonary.com, the initial defiinition of a crystal is "A homogeneous solid formed by a repeating, three dimensonal pattern of atoms, ions or molecules and having fixed distances between constituent parts." Thus, as described in Applicant's specification and made clear by common dictionary deffinitions of crystals, Applicant's substrate is a solid throughout. Clearly,

the micoporous substrates and screens referenced in Gagnon *et al* are not solid structures throughout as they are described as having void volumes of as high a 98% and typically 50 to 98 %. (Gagnon *et al*, column 6, lines 50-51).

The Gagnon *et al* reference is cited for the material used in making up the screen or microporous sheet, i.e. in column 5, begining at line 32, there is a reference to the use of fibers to construct the screen where those fibers can be "made from a variety of materials including glass, quartz, metals, alloys as well as polymeric material such as nylons, polyethylenes polystyrenes, polyacramids, polybutadiene etc." However, as is clear from this disclosure, the materials of Gagnon *et al* do not relate to a substrate but rather to the material forming the screen or cross members (fibers) of a screen. (Gagnon *et al* col. 5 line 34). When a screen is used as in Gagnon et al, the screen itself is not a transmissive substrate. Rather, the holes or voids in the screen are transmissive and a sample is analyzed in a spectrophotometer using such a screen by placing the same in the voids of the screen where the sample is stretched across the void space by surface tension. As previously stated, the use of such a device is disclosed and distinguished in the present specification in the discussion of U.S. Patents 5,453,252 and U.S. 5,723,341 where the problems relating to the use of surface tension to suspend a liquid sample in a screen are expained in detail.

The Gagnon *et al* reference uses the screen from the Truett patent, U.S. 5,453,232 and the only independent claim in that patent describes the teaching of the reference to be:

"1. An analytical specimen support for infrared microspectroscopy comprising a pair of opposed generally flat surfaaces composed of rigid material that is non-reactive to water, acidic substances and solvents and having a plurality of unobstructed holes in a screen disposed between said pair of opposed, generally flat surfaces, the cross-sectional area of each hole being suficient to retain liquid spanning said hole, the liquid being held in said hole by the surface tension of the liquid and said screen being fitted with a substantially flat plate of absorbent material disposed between said screen and one of said pair of opposed flat surfaces." (Emphasis added)

The Izumi patent has been cited as a secondary reference and would seem to be inapposite as that reference describes the fact that prior art optical processing of crystals such as KBr is both tedious and expensive:

"The substrate and correcting plate are made of a transparent material. For the intermediate infrared region they are gnerally made of an expensive KBr single crystal. The surfaces must be optically polished; however the polishing cost is considerably high because a KBr single crystal is soft and deliquescent." (Izuma col.2, lines 29-37)

That statement is, of course, consistent with the reading of Applicant's specification and again points out the desireable feature of Applicant's invention where the cost of tedious and laborious optical polishing has been eliminated by constructing the sample card as described in Applicant's claims. Accordingly, it is submited that the Izumi reference does not add to Gagnon *et al* the features that are clearly absent from that principal reference.

It is also noted that the Examiner has made a general objecion that, for example, NaCl and KBr are known as infrared materials. However, it is submited that the form of the material can be essential. For example, granular NaCL is table salt. It enhances the flavor of food but has no application as an infrared transmiting material. Once it is cystalized, it can be used as a infrared transmiting material. If it is highly polished after being crystallized it is useful for infrared spectroscopy. However, to use NaCl in a CO_2 laser, it has been found that it also needs to be made flatter than was required for spectroscopy where the light scattering is not as important. Although useful for sampling in spectrocopy when the sample is a liquid, NaCl crystal windows are not so useful to hold samples of solids undergoing analysis by spectroscopy. For those samples, it is known to prepare them for spectroscopic analysis by grinding them into fine powder. The fine powder sample is them mixed with NaCl powder. The matrix of the NaCl powder and the sample is then compressed using a die and a laboratory press into what is known in IR spectroscopy as a pellet which is an infrared light transmitting window formed by the pressing process. Further, even though NaCl powder is useful in the

field of spectroscopy for such solid sample testing, mere salt will not do. As such, only salt that has undergone purification that occurs during crystallization into a crystal can be used because raw NaCl is full of impurities which interfere with the spectroscopic analysis by creating absorbance peaks. Thus, the form of the material and the way that it is processed can be of utmost importance and the unique matching of the form and processing of material to an application can impart to that material a unique functionality.

Finallly, it is submited that there can be no resort to the secondary reference of Persyk *et al* to provide any further support for that lack of disclosure of the Gagno et al reference. As previously explained, the product producd by the Persyk *et al* disclosure is a scintillator crystal and is unlike the present invention that is used in a spectrophotometer or infrared filtometer.

The differences between a scintillator and a spectrophotometer have been previously explained and it is submitted that merely because Persyk *et al* uses a cutting step to produce a crystal for a scintillator does not make that reference relevant to the present invention relating to a substrate that allows the passage of infrared light through the device. In addition the Examiner is combining Persyk *et al* with Gagnon *et al.* With Gagnon *et al*, the screen is comprised of fibers or a microporous material such as a microporous polymer and it is difficult to envision using the cutting step of Persyk *et al* to produce the porous screen receiving means of Gagnon *et al.* However, the step of Persyk *et al* is basically sawing the scintillator material by means of a saw and, in order to expedite the further proceedings in the present application, the step of "sawing" has been cancelled from all of the claims.

In order to further stress the unobvious nature of the present invention, Applicant is submitting herewith, a Declaration of an expert in the field of optical materials, Dr. Edward Smolyarenko who reviewed the present patent application including the claims and who formed the opinion that it would be unobvious, from his knowledgeable perspective, to be able to "construct a finished product in the form of a sample holder for an infrared spectrophotometer or infrared filtometer" following the steps of claim 1 as well as the other independent claims of the application.

A further declaration is submitted of Dr. James A. de Haseth at the University of Georgia that confirms also that the invention as claimed is considered by him to achieve an unexpected result to one skilled in the pertinent art.

There is still further submitted, herewith, a declaration of the inventor, Robert Herpst, a Director of International Crystal Laboratories, the company marketing the sample card disclosed and claimed in the present application and which declaration sets forth the commercial success of those sample cards. It is respectfully requested that the aforesaid declarations be admitted into the present application even if the case is not allowed as a result of this amendment so that the weight of the declarations can be assessed by the Board of Appeals if an appeal is pursued. In addition, in the event of such appeal, it is submitted that the claims as now amended are in better form for consideration on appeal.

Accordingly, it is submitted that the newly amended claims are in allowable form over the references of record and an allowance of the present application is respectfully solicited.

Respectfully submitted,

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